21. (Amended) The saturable absorber according to any Claims 14 through 20 or 23, characterized in that the saturable absorbing effect can be set through the selection of the position of the strained-layer single quantum well (6) within the structure of the layers, whereby these layers each have a greater layer thickness than the single quantum well.

A6 cont'd

REMARKS

Claims 1 - 21 are pending in the application.

Claims 1- 21 stand rejected in the application.

Claims 1, 5 - 9, 11 - 14, 17, 19, 20, and 21 have been amended.

New claims 22 and 23 have been added.

Independent claims 1 and 14 have been amended to clarify the physical relationship between the quantum well, the cap layer, and the surrounding gaseous medium. Claims 5 and 17 have been amended and new claims 22 and 23 added to overcome the 35 USC 112 rejection relating to combined broad and limited range specification in the same claim. Claims 11 and 19 have been amended to clarify the language relating to low temperature growth. The remaining claims have been amended to overcome the objections relating to multiple-dependent claims.

These claims amendments are believed to overcome the rejection under 35 U.S.C. § 112, second paragraph as they more clearly define the invention.

THE REJECTION UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

Claims 5 and 17 are amended and new claims 22 and 23 submitted to separate the combined broad and limited claim language from within the same claim. Each of these claims now contains a single range, and as such, should be in allowable form.

Claims 11 and 19 now specify that the growth occurs at temperatures below 500° C. As a result, these claims are considered to avoid the indefiniteness indicated by the Examiner.

THE REJECTIONS UNDER 35 U.S.C. § 102

Independent Claims 1 and 14 have been amended to further clarify the physical relationship between the quantum well, the cap layer, and the surrounding gaseous medium. In particular, the degree of the saturable effect is defined by the selection of the distance between the strained single quantum well and the boundary surface of the cap layer adjacent to a surrounding gaseous medium, wherein the cap layer is a material of <u>uniform composition</u>. It can be seen that this traverses the rejection under 35 USC 102(b) over Knox, wherein the position of the quantum well is selected by varying the number of diverse layers between the quantum well and the surrounding gaseous medium, and not by varying the size of a single cap layer of uniform composition.

The rejection over Alcock is also respectfully traversed, in that Alcock does not teach a quantum well <u>adjacent to</u> a cap layer.

THE REJECTIONS UNDER 35 U.S.C. § 103 (a)

The rejections of Claims 3, 4, and 5 under 35 USC 103(a) in view of Knox are respectfully traversed as subsidiary issues in the light of the amendments to Independent Claim 1. Even accepting that someone skilled in the art might understand the requirement for strain to be in the quantum well layer, and have knowledge of suitable materials; such knowledge would not aid in controlling the degree of the saturable effect by selection of the distance between the strained single quantum well (6) and the boundary surface of the cap layer adjacent to a surrounding gaseous medium (8, 10).

Similarly, the rejection of Claims 15 – 17 over Alcock in view of Knox may be traversed for the same reason. Even knowing that the degree of the saturable effect can be modified by moving the quantum well within the reflector by transposing its position within specified diverse layers-- does not suggest varying the size of the cap layer to produce the same effect. Such consideration is clearly only available through hindsight after viewing applicant's specification.

Claim 20 has been amended to include the antireflective coating, which must coordinate properly with the cap layer, quantum well, and intermediate layer to produce the optimum saturation effect.

In view of the above amendments and remarks, it is respectfully submitted that the claims are now in condition for allowance. Reconsideration and withdrawal of the rejections and objections is requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned **"Version with markings to show changes made".**

The Examiner is invited to contact the undersigned at 703-418-2777 if he feels that an interview of the present case would facilitate the resolution of any outstanding issues. An early indication of a Notice of Allowance is earnestly solicited.

Respectfully submitted,

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VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

-- IN THE CLAIMS --

1. (Amended) A saturable reflector for a laser wavelength λ_L with which a reflector (2) is applied onto a surface of a substrate (1), and a layer sequence (3) with a saturable absorbing effect is applied onto the reflector, characterized in that the layer sequence (3) contains a strained-layer single quantum well (6) [and] adjacent to a cap layer (7) of uniform composition, whereby the material composition of the single quantum well (6), its layer thickness and its strain in the layer structure within a wavelength range all serve to define an absorbing effect, this wavelength range includes the laser wavelength λ_L, and moreover, the degree of the saturable effect is defined by the selection of the distance between the strained single quantum well (6) and the boundary surface of the cap layer adjacent to a surrounding gaseous medium (8, 10).

5. (Amended) The saturable reflector according to Claim 3 [or Claim 4], characterized in that the lattice mismatches of the materials (4, 5) of the reflector and of the material of the intermediate layer (9) are smaller than 0.005 nm [, especially smaller than 0.001 nm].

(Amended) The saturable reflector according to any [one or more] of Claims 1 through 5 or 22, characterized in that the reflector is a Bragg reflector that consists of a

first material (4) with a refractive index n_H and of a second material *(5)* with the lower refractive indices n_L, and furthermore, the intermediate layer (9) and/or the cap layer (7) consist of one of these materials.

7. (Amended) The saturable reflector according to <u>any</u> [one or more] of Claims 1 through <u>5 or 22</u> [6], characterized in that the reflector (2) consists of individual layers, each of which has a thickness that is $\frac{\lambda_L}{4 * n_{GaAs}}$ for the first material (4) with the refractive index n_H with undoped gallium arsenide (GaAs) and that is $\frac{\lambda_L}{4 * n_{AlAs}}$ for the second material *(5)* with the lower refractive indices nL with undoped aluminum arsenide (AlAs), moreover, the cap layer (7) and the intermediate layer (9) are made of one of these materials (4 or *5),* within which the single quantum well (6) made of indium-gallium arsenide ($In_XGa_{1-X}As$) is strained, whereby the indium mole fraction (x) and the gallium mole fraction (1-x) in the indium-gallium arsenide compound and its layer thickness all serve to define the absorbing effect as a function within a wavelength range, this wavelength range comprises the laser wavelength λ_L, at which a maximum of the absorption curve lies.

8. (Amended) The saturable reflector according to <u>any</u> [one or more] of Claims 1 through <u>5 or 22</u> [6], characterized in that the reflector (2) consists of individual layers, each with a thickness that is $\frac{\lambda_L}{4 * n_{InGaAs}}$ for the first material (4) with the refractive index n_H with indium-galium arsenide ($In_{0.53}Ga_{0.47}As$) with an indium mole fraction of 53% and

that is $\frac{\lambda_L}{4 * n_{AlAs}}$ for the second material (5) with the lower refractive indices n_L with indium phosphide (InP), moreover, the cap layer (7) and/or the intermediate layer (9) are made of one of these materials (4 or 5), below which and/or on which the single quantum well (6) made of indium-gallium arsenide ($In_xGa_{1-x}As$) is strained with an indium mole fraction x unequal to 0.53%, whereby the indium mole fraction x and its layer thickness define the absorbing effect as a function within a wavelength range.

9. (Amended) The saturable reflector according to <u>any</u> [one or more] of Claims 1 through 5 <u>or 22</u>, characterized in that the reflector is a highly reflecting metal mirror (11) on which the layer sequence (3) is applied.

11. (Amended) The saturable reflector according to Claim 1, characterized in that the strained layer single quantum well (6) is [a low-temperature layer] <u>grown at temperatures below 500° C</u>.

12. (Amended) The saturable reflector according to any [one] of Claims 3 through <u>5 or 22</u> [8 or Claim 9], characterized in that the cap layer (7) with the strained-layer single quantum well (6) and with the intermediate layer has an optical thickness of $\lambda_L/2$ or a whole multiple thereof.

13. (Amended) The saturable reflector according to one or more of Claims 1 through <u>5 or 22</u> [12], characterized in that the saturable absorbing effect is adjustable

through the selection of the position of the strained-layer single quantum well (6) within the structure of the adjacent layers, whereby these layers each have a greater layer thickness than the single quantum well.

14. (Amended) A saturable absorber for a laser wavelength λ_L, that consists of a layer sequence (3) of several semiconductor layers with a saturable absorbing effect on a substrate (1) that is transparent for the laser wavelength, characterized in that the layer sequence (3) contains a strained-layer single quantum well (6) [and] <u>adjacent to</u> a cap layer (7) <u>of uniform composition</u>, whereby the material composition of the single quantum well (6), its layer thickness and its strain in the layer structure all serve to define an absorbing effect within a wavelength range, moreover, a saturable effect is defined by the selection of the position within the standing wave of a laser resonant cavity.

17. (Amended) The saturable absorber according to Claim 15 [or Claim 16], characterized in that the lattice mismatches of the material of the substrate (1) and of the material of the intermediate layer (9) are smaller than 0.005 nm [, especially smaller than 0.001 nm].

19. (Amended) The saturable absorber according to Claim 14, characterized in that the strained-layer single quantum well (6) is [a low-temperature layer] <u>grown at temperatures below 500° C</u>.

20. (Amended) The saturable absorber according to Claim 15, characterized in that the cap layer (7) <u>is coated with an anti-reflective coating (8), and when combined</u> with the

strained-layer single quantum well (6) and with the intermediate layer has an optical thickness of $\lambda_L/2$ or a whole multiple thereof.

21. (Amended) The saturable absorber according to any [one of] Claims 14 through 20 or 23, characterized in that the saturable absorbing effect can be set through the selection of the position of the strained-layer single quantum well (6) within the structure of the layers, whereby these layers each have a greater layer thickness than the single quantum well.